Vol. VI. February, 1940 No. 2.

DISEASES OF THE CHEST

Official Organ of the Amer. College of Chest Physicians
Editorial offices 1018 Mills Building, El Paso, Texas.
Business Address, Physicians Postgraduate Press.
P. O. Box 1069, El Paso, Texas
MEMBER: ASSOCIATED EDITORS OF TUBERCULOSIS PUBLICATIONS

(A MONTHLY PUBLICATION)

Subscription: United States and Canada $2.50 per year. Other countries $2.75 per year.
Entered as second-class matter August 18, 1936, at the post office at El Paso, Texas, under the Act of August 24, 1912.

Editorial Comment

Symposium on Tuberculosis at Meeting of the A.M.A.

The Editorial Board of "Diseases of the Chest" extend their congratulations to the Committee of the American College of Chest Physicians for the Advancement of Scientific Programs in Organized Medicine and to Dr. Champ H. Holmes, the chairman of that committee. Because of the untiring efforts of the committee, we are happy to announce that a "Symposium on Tuberculosis" as recommended by the committee of the College has been accepted by the Scientific Assembly of the American Medical Association.

The symposium will be presented in the section on the Practice of Medicine at the 1940 meeting of the American Medical Association to be held at New York City, June 10-14.

The Fellows of the American College of Chest Physicians who will present the "Symposium on Tuberculosis" and the subjects which they will speak on are:

Dr. Jay Arthur Myers, Minneapolis, Minnesota, *Epidemiology*.

Dr. Hugh M. Kinghorn, Saranac Lake, New York, *Diagnosis*.

Dr. Ralph C. Matson, Portland, Oregon, *Treatment*.

The papers will be discussed by eminent chest specialists.

It is expected that more than 15,000 physicians will attend the meeting of the American Medical Association in New York City this year. This is expected to be the largest assembly of physicians to congregate in any one city at one time. Is it therefore not timely, to present before such an assembly, a symposium on a medical problem which causes more deaths in the productive ages of man than any other single cause? Or, is it preferable that the Tuberculosis Specialists meet within their own select group in annual session, and that they make no effort to present papers on tuberculosis before the 15,000 physicians who will attend the meeting of the American Medical Association this year? For thirty years, the latter has been the accepted policy of our tuberculosis physicians.

Yet, the cry has been and still is: "the general practitioner in medicine must be educated to recognize tuberculosis in its early manifestations if further progress is to be made". How are we to do this, if we do not meet with him and take advantage of the opportunities which are afforded to us to present this educational program to him? It is the belief of the Fellows of the American College of Chest Physicians that every avenue

of approach should be utilized to its fullest extent in order to bring to the attention of the physician in the general practice of medicine such information and knowledge which will be helpful to him in the early diagnosis of tuberculosis and other chest diseases.

It is for this reason, that the American College of Chest Physicians meets annually with the American Medical Association and it is for this reason that "Diseases of the Chest" is published.

The "Symposium on Tuberculosis" is but the beginning. The ultimate goal is the establishing of a "Section on Chest Diseases" within the structure of organized medicine. It should have been done many years ago—the Fellows of the American College of Chest Physicians hope that this will be brought about before long.

C. M. H.

A Reader's Comment

We are pleased to publish the following letter which has come to us unsolicited. This reader of the Journal and Fellow of the American College of Chest Physicians is unwilling to be lulled into a false sense of security, and he has the courage of his convictions to so express his thoughts without fear of reprisals or loss of prestige.

The editorial columns of "Diseases of the Chest" are available to physicians who have constructive criticism to offer, and only, when the last case of tuberculosis has been eradicated, will we cease our criticism of those who "pat themselves on the back" because the death rate of tuberculosis has been declining. Let us not lose sight of the fact that it is still the greatest cause of death between the age group of 20-45.

It is silly to accept the sugar coated propaganda of paid publicity agents verbatim. Let us feel free to find fault when and where it is needed. Only by a free and open discussion of the problems which confront us, will we make greater progress in our fight against tuberculosis. And, *lest we forget*, tuberculosis and its treatment, is still a medical problem. Take the lead doctors, or others will lead you, and not always in the right direction.

C. M. H.

"Dear Editor:

"Your September number of *Diseases of the Chest* has just been received, and I note the first article under the caption of 'Editorial Comment', by C.M.H., and have a thought on the '18 per cent of the public believe that tuberculosis is caused by a germ'.

"In my opinion, the reason for this popular idea in such a small percentage is because of the type of education that has been done. I think the thing that has been missed in tuberculosis educational campaigns, whether by newspaper, radio, or talks, is that tuberculosis is infectious and that this characteristic has not been stressed enough. There seems to be a tendency on the part of tuberculosis workers to minimize or to skip over this word 'infectious', whereas it is my thought that the word should be stressed. It does seem to me that it is inadvisable to refrain from comparing it with the other infectious diseases, such as diphtheria, small pox, typhoid fever, etc. This has been a thought I have had in mind for a long time and on all occasions, whether speaking to a group or talking on the radio, I have insisted on beginning the talk with the statement, 'Tuberculosis is an infectious and communicable disease' and ending the talk with the same statement. Not only that, but if, as is usually the case, it is a lay group, I have explained what I mean by 'communicable' and 'infectious'. Locally, both in our Health Department and in our tuberculosis conferences in Buffalo and Erie County, I have been kidded because of the fact that I wanted to scare people. That is not my idea at all, but I do think we should impress on the public that it is an infectious disease as well as communicable and explain what we mean, so that our education would be more effective.

"I note that 76 per cent of people think that tuberculosis in contagious. Apparently their informants have not taken the trouble of going into detail as to what contagious means.

"Also, in reading over the address of the incoming president, Dr. Ralph Matson, I quite agree with the sentiment expressed in this address that the education of the public should be done more by the medical profession than by the lay groups. I do not believe that this education would have been so lopsided as it apparently has been, according to the Gallup poll.

"I have no criticism of lay groups in their efforts to educate the public concerning tu-

berculosis, with the exception that I do think the direction should be by a trained tuberculosis physician, rather than by a lay man. Not only in tuberculosis work, but in all work and activities relating to medicine, I think we of the profession have not been intimately enough identified with it, that is I think we should have taken a more prominent part in these various educational campaigns and that they should have been directed by trained medical men.

"I am afraid that our profession as a whole has been a little too aloof in the whole matter of medicine; hence the criticisms and false accusations and troubles we are now experiencing, and, therefore, it behooves us from now on to be more forceful in our demands of how medicine or its specialties shall be administered.

"This is quite a rambling note, but what I meant to say was that I was very pleased with both these articles and with the Journal in general and only wish I were more adept at writing so that I might contribute to them.

"I wish to express to you and all the other officers of the American College of Chest Physicians, my appreciation of your splendid efforts in perfecting this organization and publishing this Journal, because I, too, am and have been for the past twenty-seven years, most intensely interested in the subject of tuberculosis.

Fraternally yours,

NELSON W. STROHM, M. D.

361 Delaware Avenue,
Buffalo, New York."

"Pneumothorax Safety" Attachment of the water manometer to the pneumothorax apparatus in 1904, was the first great step in pneumothorax safety. This made the intrapleural pressure readily determinable before, during, and after, instillation of gas and the amount of gas administered can be governed accordingly.

There remained, however, the hazard of air embolism. Air embolism is believed to produce symptoms of a serious nature only when the air is in the blood vessels in the brain. It has been observed that if a patient suffering with symptoms of air embolism is turned "upside down", the symptoms promptly disappear. It is necessary to maintain the position for from four to twenty-four hours. Putting the patient on his back in the Trendelenburg position, with the neck extended and the head lower so that it is upside down, is satisfactory.

A patient, 70 years of age, to whom such posture was applied after several minutes of apparent death from air embolism, revived and was able to leave the hospital on foot the next day. During the first four hours after heart and respiratory function were resumed, the patient complained of headache, dizziness, and was moderately irrational.

What to do, in the event of symptoms suggesting air embolism, should be given wide publicity.

The explanation is extremely simple. Blood, by gravity, replaces air in the cerebral centers. The air is displaced to other parts of the body where it does no harm until it is absorbed.

F. W. B.

A Caution It is at this time of the year that respiratory infections are so prevalent—and often reach epidemic proportions in many sections of the country. They are glibly, loosely and usually erroneously called influenza or the "flu". It must not be forgot—or better—it should be kept in mind; that these respiratory infections are frequently the precursors of pulmonary tuberculosis. Indeed, as is well known, they may be acute manifestations of this disease itself. Particularly, keep a watchful eye on those cases of atypical pneumonia and on your pneumonia cases displaying a tardy and sluggish resolution. That cough which so persistently and stubbornly hangs on after the cold or "flu", should be viewed with suspicion. Investigate!

A latent or dormant tuberculosis lesion may be, and frequently is, kindled into activity in the flame of these acute respiratory disorders. It would be a wise policy to counsel every patient on recovering from an acute respiratory episode of more than fleeting duration or mild severity, to return in about three months for a follow-up examination. Many, probably the greater number, will not heed this advice; but there are others who will. In this latter group, the early diagnosis of pulmonary tuberculosis will not uncommonly be the resulting yield.

C. H. H.

Diverticulum of the Pharyngo-Esophagus
A Report of Two Interesting Cases

DELFOR DEL VALLE, M.D., and ARNALDO YODICE, M.D.
Buenos Aires, Argentina
PAUL W. GEBAUER, M.D. *
Cleveland, Ohio

THE first of these cases is interesting because surgical excision is not frequently used in Argentina, and because in this instance a technique was employed which had not been previously reported by South American Clinics.

Case 1.—J. L., a 70 year old Italian female, entered Ramos Mejia Hospital in 1934 with a history which was typical of the nuchal accumulation of food. Dysphagia, regurgitation and vomiting, choking, and neck swelling had first been noted ten years previously when a diagnosis of esophageal diverticulum had been made. During this period medical treatment and symptomatic measures were administered. In the two years preceding admission there had been a gradual and pronounced decline in strength and a 55 pound weight loss. Most of the patient's food, which was taken every three hours and was entirely limited to liquids, was vomited shortly after deglutition.

Examination revealed evidence of severe malnutrition, and the occurrence of a mass seven centimeters in diameter in the lower mid neck following the intake of food. The latter was promptly vomited with the exertion of pressure on the mass. Roentgenologic studies (Fig. 1 A) revealed a large diverticulum of the pharyngo-esophagus occupying the prevertebral space in the posterior mediastinum. At esophagoscopy the diverticular orifice, measuring one centimeter in diameter, was located at the origin of the esophagus in its posterior wall. Laboratory studies were normal except for a slight anemia.

After a period of preparation, during which the diverticulum was lavaged with a catheter, the neck was incised along the interior border of the left sternocleidomastoid muscle; the diverticulum was isolated by dissection and exteriorized. The outer layers were sutured to the skin (Fig. 1 C). Excision of the diverticulum was performed three weeks after the first stage. Rather than re-enter the fascial planes of the neck and thereby risk a descending cervical infection and mediastinitis, the outer fibromuscular layer of the diverticulum was entered and a submucosal dissection carried out to the orifice of the sac. In this manner the protective adhesions sealing off the fascial planes of the neck were not disturbed (Fig. 2). Some residual esophageal stenosis required intermittent dilatation for a short time following operation. The patient made an excellent return to good health.

Histologic studies confirmed the technique of submucosal dissection, the intranuchal portion of the diverticulum being devoid of its fibromuscular coat. This technique was devised by the authors without the knowledge that it had been previously described by Lahey.

The second case had a gratifying surgical result as well as a rather remarkable pictorial exhibition of esophageal perforation and descending infection from the neck into the mediastinum.

Case 2.—M. O., a 72 year old woman, was admitted to the Otolaryngologic Service of Cleveland City Hospital on November 30, 1938 with a history of dysphagia and regurgitation for six months. Roentgenologic studies revealed a small diverticulum of the esophagus (Fig. 3 A). Esophagoscopy was done and subcutaneous emphysema was noted the next day. A low grade fever persisted for six days. The patient was discharged December 7, 1938. The patient was readmitted on the Thoracic Surgical Service December 20, 1938 with the history that ten days following esophagoscopy she gagged and vomited old blood and foul yellow mucous. She had a sensation of fullness in the mid chest, substernal pain, and

(Reading Matter Continued on Page 43)

* From the Gastroenterology Service of Ramos Mejia Hospital, Buenos Aires, and the Department of Thoracic Surgery, Cleveland City Hospital and Western Reserve University, Cleveland, Ohio.

FIGURE 1.

Case 1. A—Oblique view of large diverticulum outlined by arrows and half filled with barium occupying the prevertebral space in the mediastinum. B—Barium in the esophagus following removal and esophageal dilatation. C—After dissection and exteriorization of the diverticulum at the first stage. D—Final result. Scar marked by arrows. Notable weight gain.

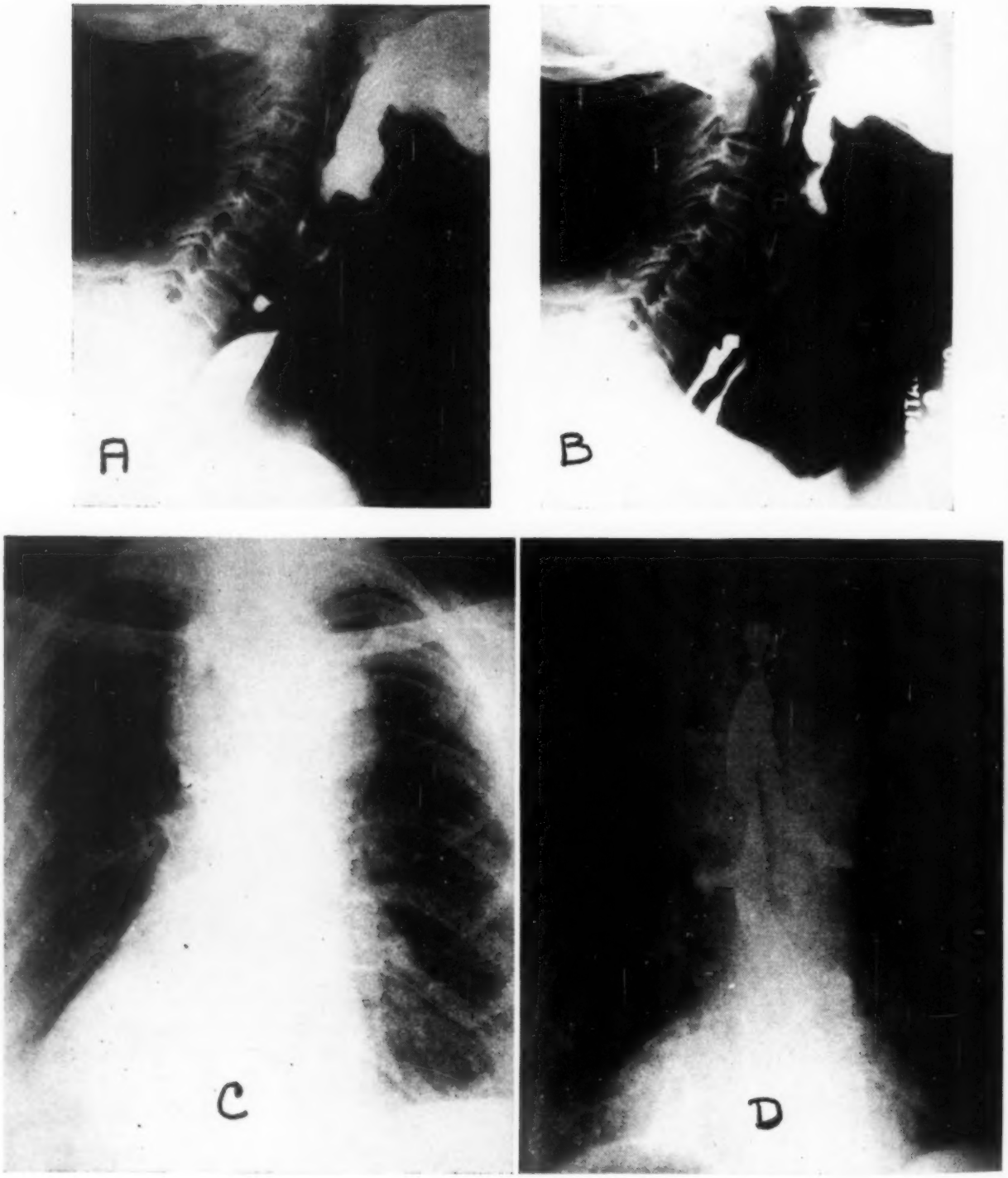

FIGURE 3.

Case 2. A—Lateral view of a small barium filled pharyngo-esophageal diverticulum. B—The same view about 2 weeks later showing barium in the esophagus and also coursing down the mediastinum from the perforated diverticulum. C—P-A roentgenogram of chest showing huge mediastinal mass before barium was given by mouth. D—The same following the administration of barium by mouth. Barium can be seen in the esophagus and also coursing down the mediastinal planes into the large mediastinal abscess.

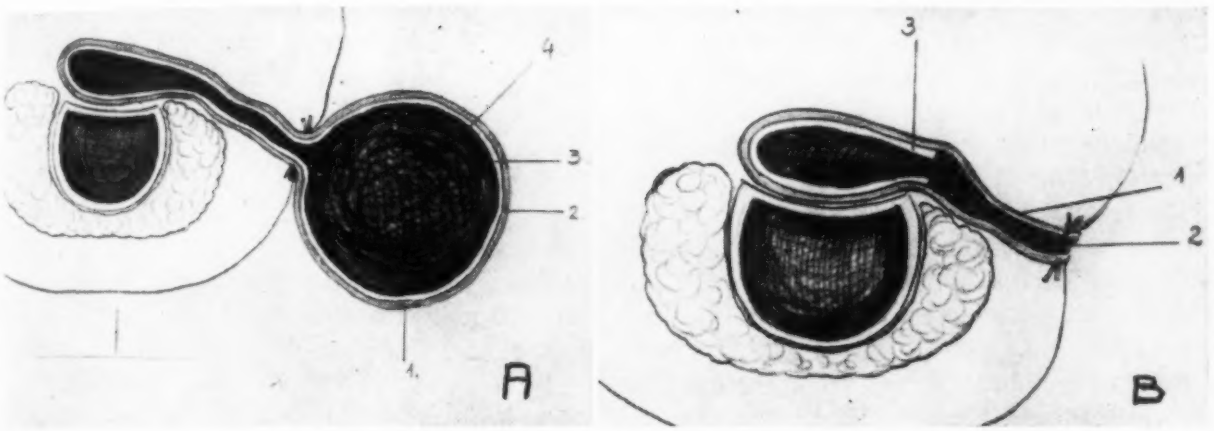

FIGURE 2.

Case 1. A—Rough sketch illustrating anatomical relationships after the first stage. 1. Diverticular sac. 2. Fibromuscular coat. 3. Mucosa. 4. Interior of sac. Fixation of fibromuscular coat to skin. B—Showing removal by submucosal dissection without disturbance of adhesions between the fibromuscular coat and the structures of the neck.

FIGURE 4.

Case 2. A—Same as A in figure 3. B—Oblique view showing enlarged diverticulum and sinus tract leading into the mediastinum 2 months following drainage of mediastinal abscess. C—Lateral view of neck with barium in esophagus 10 days following removal of the diverticulum and the sinus tract. The site of the ligature about the neck of the diverticulum can be visualized. The angulation is due to inversion of the stump.

(Continued From Page 40)

increased dysphagia. A chest roentgenogram taken before admission (Fig. 3 C.) showed a large mediastinal mass. After admission further roentgenograms revealed a perforation of the diverticulum, a tract in the mediastinum leading to a large abscess above the fascial attachments to the pericardium (Fig. 3 B and D). A nasal tube was passed into the stomach for feeding purposes and posterior mediastinotomy was done (P.W.G.) on December 22, 1938 by resection of the juxtavertebral portions of the fifth and sixth ribs. The

pleura was not opened. An abscess containing 300 cubic centimeters of foul pus was drained. After a few days the wound packing was replaced with a rubber tube and Dakin's solution irrigations begun. The patient made a good recovery and left the hospital January 21, 1939. A drainage tube was left in place because barium sulphate solution when swallowed could be demonstrated coursing from the perforated diverticulum into the mediastinum through a "stringlike" sinus tract (Fig. 4 B).

Following her discharge from the hospital the symptoms of dysphagia and regurgitation became worse, the diverticulum enlarged, the sinus tract persisted and the drainage through the tube remained scanty. The patient was readmitted and bilateral exploration of the neck carried out by another surgeon. The diverticulum or the sinus tract could not be located. A month later esophagoscopy and dilatation (P.W.G.) over a previously swallowed string failed to afford relief from the symptoms of which the patient complained bitterly. On April 17, 1939 the neck was re-explored (P.W.G.) and the diverticulum identified as well as the sinus tract. The former was dissected free, the neck ligated, and the stump inverted after excision (Fig. 4 C). Three weeks after operation the tube draining the mediastinum was removed and the patient made an excellent and uneventful recovery. In subsequent roentgenograms the mediastinum was completely clear.

Tuberculosis Among Indians*

RALPH M. ALLEY, M.D.
Shawnee, Oklahoma

THE following questions are frequently asked of those physicians who do tuberculosis work among Indians:

"Why are Indians so susceptible to tuberculosis?"

"Why does so much tuberculosis exist among Indians?"

Close observation over a period of eight years has convinced me that factors other than a susceptibility to the disease peculiar to Indians, must receive consideration.

It is a fact that tuberculosis is at the present time the greatest scourge among Indians. A survey run on any given group of Indians and whites living in the same community will show that there are a greater number of reactors to the tuberculin test; and more active cases will be found among the Indians than among the white group. I do not believe that susceptibility to the disease is entirely responsible for this condition.

Frequently in making calls in Indian homes, an extremely ill patient will be found in a small room, windows nailed shut, and the other members of the family gathered in the same room with the patient. This group often contains an old Indian man or woman with chronic fibroid tuberculosis, sitting in a corner of the room, coughing and expectorating, allowing the sputum to fall where it may on the floor. A baby or several small children may be found playing on the floor.

Indians gather from all over the reservation and from surrounding reservations for numerous celebrations. These gatherings are usually held in a large structure, poorly ventilated, in which many Indians will live for weeks. Several open cases of tuberculosis are usually in such a group.

Indians, as a whole, do not receive a proper diet. There is usually plenty of food, but of a poor variety, and frequently meals consist of a single item of food. Sanitary facilities in the average Indian community are poor.

The economic status and living conditions of the average Indian compares favorably with those found in the tenement districts of our larger cities. It is common knowledge that these districts are a breeding place for tuberculosis.

A study of serial x-ray films of the chests of 1500 Indians, which we have on file, to-

* Published with the permission of the office of Indian affairs, Department of the Interior.

gether with several hundred additional films which have been sent to us for interpretation, reveals the following facts: Completely healed lesions are often noted, and lesions in which the healing process is taking place are more frequently noted. In the majority of these cases, no treatment has ever been received, indicating that natural healing takes place in Indians as well as whites. Exceptionally few rapidly advancing lesions have been observed by us in sanatorium patients. Indians respond very well to treatment. These facts indicate that the same defense mechanism set up in the body of the white patient to combat the disease is also present in the body of the Indian patient.

Over crowding and a lack of proper sanitation subjects the Indian to a heavy exposure to tuberculosis. These circumstances and a lack of a properly balanced diet, do not tend to produce favorable conditions for warding off the disease after exposure has taken place. These conditions, to which the average white person is not subjected; together with the fact that Indians do not consult physicians as freely as the whites, account for many advanced cases among Indians.

Having attempted to give a few reasons as to why tuberculosis is more prevalent among Indians than whites, I shall now attempt to briefly point out what the Indian Service is doing to combat these conditions. Much progress has been made during the past few years.

First, an attempt is being made to improve the economic status of the Indians. This is being accomplished in several ways: by making it impossible for the Indians to dispose of their land, by establishing an Indian C.C.C. corps which is building roads, irrigation projects, doing soil erosion work, etc. High grade livestock has been made available, and overgrazing of land corrected. On many reservations, ample, sanitary community houses have been erected in which the Indians now hold their gatherings.

Second, from a general medical standpoint, the Indian Service is working to better the Indian's health through hospital service, nursing work, immunization programs, clinical work and health education. In areas where Indians live scattered among the whites, the Indian Service has worked out cooperative arrangements with the states and counties for health services. Public health nurses in these areas are calling on Indians and whites alike, and the Senior Physician for the jurisdiction is deputized as a state health officer by special arrangement between the state health departments and the Secretary of the Interior. In the remainder of the Indian areas, the Indian Service furnishes its own medical service. During the past fiscal year, the Indian Service maintained 79 general hospitals with 2,968 beds and 362 bassinets. Either full time or part time physicians are stationed on each reservation. 111 field nurses were employed to aid the physicians to carry on a public health program. Physicians and nurses especially trained for tuberculosis and trachoma control work are available to aid these respective programs. Housing programs have been instituted and sewage disposal improved.

Third, from the standpoint of tuberculosis, an extensive program to combat the disease has been inaugurated. This campaign includes education of the public, preventive measures, and a drive to discover, isolate, and treat the greatest number of active cases.

School children are examined each year. Those with known positive tuberculin reactions receive a chest film. Negative reactors from the previous year and new students are given the tuberculin test; the reactors receiving x-ray studies. Active cases, when found, are isolated in sanatoria. Those cases with the childhood type, not acutely ill, are allowed to attend school, and checked frequently with x-ray films. It might be of interest to note that in this jurisdiction (Northern Idaho) a recent survey on school children was run. 324 Indian children were examined and approximately 200 white children. The Indian children ran 50.8 per cent positive reactors, and the white children 9.3 per cent. The x-ray follow-up has not been completed, but 16 active cases were found among the 127 Indian children x-rayed. I do not have information on the follow-up work done on the white children, at this time. A good many of the positive reactors among the Indian children were former sanatorium patients, inactive at the present time, which accounts somewhat for the high percentage of reactors.

A close affiliation is maintained with the Henry Phipps Institute in Philadelphia. The

director of this Institute, Dr. Esmond R. Long, is the Indian Service tuberculosis consultant.

Recently, over 3700 people were examined on the Pine Ridge Reservation. 17 per cent of all examined were found to have chest lesions, 67 of these were active cases of tuberculosis, so were placed in a sanatorium. At the present time a drive is being made in the Navajo area, where a tuberculosis expert has been permanently assigned to direct the campaign.

During the past year, the Indian Service maintained 14 sanatoria, with 1342 beds. In these institutions, collapse therapy receives special attention, under the direction of capable physicians. 4088 Indian patients were treated for tuberculosis in hospitals and sanatoria during the year.

In addition to the collapse therapy available in institutions, the Indian Service maintains several ambulatory pneumothorax clinics. Every effort is being made to give the greatest possible number of active cases this treatment. A special position has been established at the Henry Phipps Institute, where Indian Service physicians are sent for training in x-ray interpretation and pneumothorax technique. As mentioned above, nurses specially trained in tuberculosis control are also active in the campaign.

Summary

The economic and living conditions of the Indians contribute to the high incidence of tuberculosis among them.

Natural healing takes place in Indians as well as whites, and Indians respond well to treatment, indicating that the Indian has developed a defense mechanism against the disease.

The Indian Service is carrying on a very intensive program to discover and treat active cases of tuberculosis among Indians, collapse therapy being stressed.

The present program, in a few years time, it is hoped will result in a much lower incidence of tuberculosis among Indians.

Some Notes on the Clinical Importance of the Primary Infection as a Precursor of Adult Tuberculosis

THOMAS F. O'LEARY, M.D.
Philadelphia, Pennslyvania

IT is a well established truth that the great majority of cases of adult tuberculosis have their origin in the primary infection or childhood type of tuberculosis. Because of the paucity of symptoms of disease in the childhood form there is a natural tendency to make light of this form as a clinical entity. This attitude, however, should not exist. The ideal aimed at in the control of any disease is primarily the prevention of the disease. If childhood tuberculosis is looked upon as the dominant precursor of adult type tuberculosis, its importance is more easily appreciated. The economic, social and individual effects to be wrought by the diagnosis and proper observation and treatment of the primary infection type is undoubtedly of greater significance in the control and reduction of adult tuberculosis, than is the diagnosis and treatment of the adult form once it has developed. Once a child is known to have a definite primary infection, it is just as important to prevent that child from developing the adult form as is the Pasteur treatment for the prevention of rabies, when a child has been exposed to this infection. Certainly, the recognition of the importance of this has proven a far more effective method of control than in attempting to cure hydrophobia once it has occurred.

In evaluating the clinical importance of the primary or childhood type of tuberculosis, a very plausible exposition is proposed by Dr. James Alexander Miller of New York, which makes more significant its relationship to adult tuberculosis. Fundamentally it is this: Tuberculosis is a systemic disease. The primary infection is, one, Pulmonary, and two, Lymphatic which constitutes the primary complex. Systemically, we have: first, Primary infection, second, Dissemination phase, third, Tertiary phase—various organs.

In the primary infection, the insidious form is more frequent than the pneumonic form.

When inhaled, tubercle bacilli settle near the pleura and form a tubercle, the primary focus, which in turn drains through the lymphatics to the regional lymph nodes. The sub-pleural lesion always tends to heal. From the nodes, hematogenous infection may occur, resulting in miliary or organ tuberculosis or may lead to chronic pulmonary tuberculosis in adult life.

Dissemination phase: From the lymphatic system, the tubercle bacilli enter the pulmonary artery, thence to the lung. Tubercle bacilli are lodged not in the air spaces, but in the lung tissue itself. If overwhelming in dosage, miliary type is frequent. There is no real pneumonic exudate in the air spaces in this phase. The tubercle bacilli are very apt to be again disseminated through the lymphatics; again to the blood stream; to the pleura; to the air spaces. This often is all that occurs. The lesion may become fixed in the apical portions of the lung and go to rest. The great majority of adult cases of tuberculosis develop from these apical residues from a hematolymphogenous origin. Indeed, much more commonly, than from exogenous infection.

The infection may not become localized in the lung, depending upon the dosage and the pulmonary barrier, and then it may become systemic with extra-pulmonary lesions. The apical residues may become active from various circumstances, giving the clinical forms of acute onset of tuberculosis. If the apical rests remain latent, it will also be dependent on various other factors, e.g. the ability of the tissues to keep the bacilli fixed; difference in reaction of the host to infection; and variations in resistance. Resistance varies with age, race and constitution. The constitutional factor is apparently important; it may be inherited. No race is absolutely immune, if the dosage is high enough. Hypersensitivity to exposure to tubercle bacilli may cause apical residues to spread.

It is important to try to determine which of those found in childhood are innocuous and which will later result in the adult form of tuberculosis. It is only in this way that adult tuberculosis will be controlled. To determine which cases need treatment requires constant vigilance and frequent check-up examinations. The change in the sensitivity or allergy of the individual is a factor that may determine the development of active tuberculosis.

Studies of various investigators in the field of tuberculosis have found that the child who reacts to tuberculin is more likely to develop the reinfection or adult type of disease, which dissolves the old idea that a primary infection lent a certain immunity to the individual against the reinfection type. In fact, in one study of 400 children who reacted to the tuberculin test and who were observed over a period of 10 years or more, 15 per cent fell ill with the reinfection type. If this observation is a general one, it certainly indicates the importance and seriousness of primary infection in human beings. The great reduction in the incidence of bovine tuberculosis by the tuberculin testing and the subsequent slaughter of positive reactors is ample evidence of how this disease has been controlled in cattle. Naturally, the idea of slaughtering all individuals with primary infection type tuberculosis is not to be advocated. But the failure to properly evaluate and observe individuals with the primary infection type in many instances eventuates in a long but certain dissolution of the individual.

The means at our disposal for the diagnosis of the primary infection are reliable and simple procedures. Tuberculin testing should be considered equally as important as the Schick test for diphtheria and should be made a feature of every complete physical examination. A roentgen ray study of every positive reactor completes the means of diagnosis. Physical examination is usually of no value in the diagnosis of primary tuberculosis infection.

Certainly, the great expense involved in the months and years of hospitalization of individuals with adult tuberculosis with its attendant social and individual aspects are tremendous. It seems reasonable to believe that a more serious appraisal of the primary infection and the proper observation and treatment when necessary in properly conducted preventoria would greatly diminish the number of reinfection adult types or at least render earlier the diagnosis of the onset of reinfection, which could then be controlled in a large measure by modern methods of collapse therapy.

It is appalling and a sad commentary on the apparent strides that have been made by the medical profession in the fight against tuberculosis to learn that approximately 75 to 80 per cent of patients entering sanatoria today are moderately or far advanced cases. in spite of all the modern methods of diagnosis.

It can therefore be readily observed that since most cases of adult pulmonary tuberculosis result from the primary infection type, it behooves the medical profession to recognize the importance of the primary infection type of tuberculosis as a clinical entity. To diagnose and properly observe by constant vigilance these cases will be a great step in the ultimate reduction of adult type tuberculosis which still remains the "captain of the men of death" between the ages of 15 and 35 years.

References

1. Myers, J. A., "The Physician and Tuberculosis," *J.A.M.A.*, Vol. 113, No. 3, July 15th, 1939.
2. *Notes from Clinical Lectures*, J. A. Miller, M.D., Bellevue Hospital, N. Y.

Case Finding and Case Follow-up in Tuberculosis Control *

H. C. SCHENCK, M.D. **
Atlanta, Georgia

THE purpose of this paper is to point out what are now generally recognized as the most practical and least costly methods of tuberculosis case finding and to discuss the follow-up of the cases which must be done if tuberculosis is to be controlled.

Although our tuberculosis death rate decline is a little faster than the average for the United States, a slight increase in Georgia occurred in 1938. I am glad to say, however, that comparative reports for the first four months of 1939, the extent of present figures and a like period in 1938, show that 78 fewer deaths occurred this year.

Nevertheless, it is a fact that tuberculosis remains one of our worst enemies as the following brief statements prove:

1. A large percentage (well over 50 per cent) of the population is infected as shown by the tuberculin test.
2. More than 3000 new cases are reported annually.
3. About 1600 deaths occur each year.
4. Nearly one out of every 20 deaths is due to tuberculosis.
5. Of the infectious diseases it is second as a cause of death, pneumonias being first.
6. It is the first cause of death from all causes in the 15 to 45 year old age group.

If everybody knew these facts and if everybody could know that tuberculosis is principally spread by those who have it, that most cases of pulmonary tuberculosis develop in the young adult group and that it is quite easily curable at the time it is developing, and if everyone knew that there are ways to detect the disease in whatever stage in which it might be, everyone would demand that the means for discovery of the disease be provided and that those patients who have the disease in communicable form be withdrawn from circulation as long as necessary.

It is quite apparent, then, that one of the first requisites of a case finding program is education. Every effort should be bent toward acquainting everyone with the facts; with the nature of tuberculosis, its dangers, where it is, how it may be found, how it may be cured, if curable, and how it may be prevented. This information should be given to everyone, utilizing every possible method for its dissemination. It should be taught in schools, through newspapers and magazines, moving pictures and through the radio. Physicians, public health doctors and nurses, lay lecturers, properly informed, and local tuberculosis associations can, if they will intensify

* Read at the Annual Meeting of the Georgia Public Health Association, Hotel Biltmore, Atlanta, Georgia, June 9, 1939.

** Director of the Division of Tuberculosis Control, State Department of Public Health.

their efforts, contribute much more toward the educational needs of tuberculosis case finding than has been previously contributed.

In the effort to find tuberculosis everyone engaged in case finding activities, in order to expend funds used for the purpose to the best advantage, should learn in what age, industrial and wage level groups the largest number of cases of tuberculosis are to be found.

The need for departure from some of the old procedures is so clearly shown as a result of the experience of many investigators that an attempt to cover them as fully as possible will be made. Especial attention is called to the great economic value of the conclusion that mass tuberculin testing and x-raying of reactors of grade school children, at least in those below the teen age, is of so little value that the expenditure of public funds for it is not justified.

What is the value of tuberculin testing in case finding? When tuberculin testing is employed with full knowledge of its limitations it can be used to very great advantage. It has been shown by many careful investigators that nearly all of the active cases of tuberculosis react to tuberculin. Therefore, when it has been determined to x-ray groups of apparently healthy persons in an effort to uncover tuberculosis, especially the early pulmonary tuberculosis that there is in these groups, it is time and money-saving to x-ray only those who react to tuberculin. There is enough evidence to justify the statement that active tuberculous disease is seldom present when there is failure to react to as much as 1.0 mgm. of Old Tuberculin or to the second dose of P.P.D. There are a few exceptions to this rule which make it imperative that persons with symptoms of tuberculosis, but without tuberculin reactions, be studied very carefully before it is concluded that they do not have tuberculosis[1]. It may also be stated that within a few weeks after infection practically all persons will react to tuberculin. They may or may not develop manifest disease. Whether they do depends on the massiveness of the infection and the degree of resistance that the individual can muster.

Although no age group is entirely free from serious tuberculosis, records show that persons above 2 years of age and under 13 have the lowest morbidity and mortality incidence. They also show that the greatest number of re-infection type of pulmonary tuberculosis cases develop between the ages of 15 and 25 years, and we should never forget that it is the first cause of death in the 15 to 45 year age group.

Plunkett [2] has shown that it costs 40 times as much to find a case of pulmonary tuberculosis in persons 15 years old and under as it does in those over 15. Our own figures for case finding work in 1938 show that in 2079 original or first examinations of persons 16 years of age and under only 10 cases were found, which is a percentage of .48, while in 5003 first examinations of persons over 17 four hundred cases were found, or 8 per cent, which indicates that it has cost us 17 times as much to locate the cases in the sixteenth year and under age group as it did in those over 16. We have been able to show that 8 of the cases in the first group were of teen age, leaving only 2 cases found below 13 years of age. Unfortunately, we cannot show what this percentage is as we are unable to state at this time the number of 13, 14, 15 and 16 year old persons that were included in the totals mentioned above. However, I feel quite certain that our own cost ratio is comparable with Plunkett's.

In view of these incontrovertible statistics the futility of tuberculin testing all persons up to the teen age or up to the age of 14 or 15 for the purpose of x-raying the reactors is apparent. The wise physician will keep in mind, however, that serious cases do develop at all ages and will in all cases of illness with symptoms such as are produced by active tuberculosis insist on making the necessary study to prove the nature of the illness. Such study of ill children may well include tuberculin testing, x-ray and laboratory tests and, certainly, sputum examinations when there is cough.

Granting that reactions occur within a few weeks of infection it is apparent that in a case finding program the testing of infants and pre-school children can be of immense value. Such testing should be done not with the idea of x-raying the reactors, but, by investigating the family and other personal contacts, for the purpose of locating the source of the infection of these children. The younger the child who reacts, because his

contacts with others are relatively few, the more certain is the source of his infection to be uncovered. If tests of these children are made at intervals of every 6 months until a reaction occurs a fairly close estimate of the time of infection can be had and a study of the associates of the family may reveal the scource of infection. Although the Mantoux test is the more accurate method, the Von Pirquet test may be used in infants and followed, if negative, by 0.1 or 1.0 mgm. O. T. intradermally. Vollmer's patch test is simple and has much to recommend it. It is much easier to use in young children than the Von Pirquet or Mantoux. Shick [3] believes that the patch test can be of definite advantage in the campaign against tuberculosis.

In persons 14 or 15 to 27 years of age, the wisest procedure appears to be to encourage universal tuberculin testing and x-ray of reactors. Every person in this group not reacting should be tested annually until a reaction occurs. It is easier, of course, to do this in schools, but since there are about 11 times as many deaths from tuberculosis in the common labor group every possible effort should be made to include this low income group in the case finding program. The reactors in this age group should be studied at least once a year and this study should include x-ray examination. Servants come from and are a part of this low income group and are principally Negroes. 63 per cent of the tuberculosis we have is in this race and it is apparent that much case-finding and case follow-up work needs to be done among them, if we ever expect to rid ourselves of tuberculosis.

Fluoroscopic x-ray examination done at intervals of 6 months by clinicians especially trained in its use would disclose tuberculosis as it develops. If the fluoroscope is used it should be with the understanding that x-ray pictures are to be made of all cases found to have abnormal shadows in the lung. Such use of the fluoroscope to screen out the more expensive x-ray picture can be of distinct economic value.

In the group over 27 years of age all household contacts should be x-rayed and every person with symptoms which might be due to tuberculosis should be tuberculin tested and x-rayed if found positive.

Every person with chronic cough should not only be tuberculin tested and x-rayed, but should have sputum examinations which, if repeatedly negative, should be followed by animal inoculation. It should be remembered that a diagnosis of tuberculosis depends on the correlation of many factors none of which by itself can ever justify a diagnosis. History of illness, tuberculin test, sputum examination, other laboratory tests and x-ray are all required. And here it must be emphasized that one is never justified in making a diagnosis of tuberculosis from the x-ray alone. An x-ray picture can show abnormal shadows and the presence of disease, but it cannot show etiology. Myers[4] says that x-ray interpretation should be made only by physicians who know the limitations of x-ray examination.

Case Follow-up

Two main types of tuberculosis are recognized, viz; primary or first infection tuberculosis commonly known as childhood tuberculosis, which is a misnomer as it may occur at any age, and secondary or re-infection tuberculosis.

Primary tuberculosis is usually benign and heals itself without treatment. Massive first infections may result in fatal forms such as meningitis and miliary tuberculosis, which more commonly develop in the second year of life and usually from 4 to 6 months after the primary infection. Any pre-school child with a positive tuberculin who becomes ill, unless it is manifest that the illness is due to other causes, should be suspected of having tuberculosis and have a complete examination including x-ray study. Every grade school child having illness, the etiology of which is not evident, should be tuberculin tested and x-rayed if reaction occurs. In all cases where x-ray shows pulmonary pneumonic areas, such as are produced by primary tuberculosis, careful study including serial x-rays to determine whether other causes including secondary or reinfection tuberculosis may be the real factor should be made.

Primary tuberculosis, which often manifests no symptoms or x-ray evidence of disease, is non-communicable unless there is cough with expectoration—which is rare. It must be remembered that children or adults with primary tuberculosis are subject to all the

other common respiratory diseases other people are subject to and in each case careful differential diagnosis must be employed.

No child not sick should be excluded from school because of a positive tuberculin test or because of a diagnosis of childhood tuberculosis. No sick child should be permitted to go to school for obvious reasons until he has recovered from his illness. (I do not believe curricula should be so hard that children cannot remain out of school a few days on account of illness without hope of making up for lost time and securing full credits without harmful effort.)

The important thing to remember in primary tuberculosis which the tuberculin reaction proved to have occurred is to prevent further infection.

In early secondary tuberculosis, that is, the adult type, when it has recently developed and is not extensive, strict bed care, either in a sanatorium or in the home, should be immediately insisted upon. After a few weeks, say six, another picture should be made to determine whether the lesions are retrogressive or progressive. If the latter, or if stationary, lung compression, usually by artificial pneumothorax, is probably the best procedure to take. It was Amberson's [5] experience that about 90 per cent recovered after a few months in bed with no other treatment. Right living and working conditions preserve the cure. Such patients should have, following arrested disease x-ray check-ups every 3 or 4 months and oftener if necessary until the lesions have definitely become stable. The slightest return of symptoms should be the signal for x-ray check-up and return to bed.

Certain types of advanced cases should be kept in bed by all means and entered in sanatoria whenever possible. Many of these can be brought to an arrested stage by a combination of bed care and lung collapse measures. Whenever there is cough and expectoration the greatest effort should be made to protect the other members of the family and the community. Institutional care, while most desirable for these cases, is impossible to obtain, in Georgia, except for a short time. And there is no prospect that sufficient beds will be made available soon. Therefore, local health and other agencies should leave no stone unturned to provide food, shelter, medical care and isolation in each case as may be required. Re-examination as often as necessary should be arranged for by the health authorities in all cases requiring such help.

Many other cases having no hope for cure are existent. Some are chronic cases not bed-ridden and these are a serious menace to family, friends and the community in general. Others are bed-ridden. At the present time nothing can be provided for them except what can be done by the local authorities. Every one of these cases are serious health problems which can be solved only by the community itself. The public health worker is faced here with the responsibility of stopping, in any way he possibly can, spread of infection from these individuals. Only the closest sort of cooperation of local welfare agencies, other agencies including public health, and the entire community can satisfactorily solve the problem of preventing infection from the indigent open case and the willful non-cooperative open case of means.

When the people as a whole get tired of seeing tuberculosis, an entirely preventable disease, kill off people by the thousands and can dispense with the unreasoning sentiment which permits uncurbed spread of infection and will put into effect the measures which are necessary to stop infection, then and then only can tuberculosis be wiped out. It will cost money—money for relief, money for case finding and for sufficient beds. I believe it can be done and you believe it, but not enough other people believe it sufficiently to secure the money required for the purpose. And so we come again to the need for the widespread dissemination of what we know. Primarily, education is the answer.

References

1. Hetherington, H. W., "The Diagnosis and Management of Latent, Suspected and Early Clinical Tuberculosis," *Jour. A.M.A.*, Dec. 11, 1937, 109, 1953.
2. Plunkett, R. E., "Case Finding," *Amer. Rev. Tuberc.*, 1939, 39, 263.
3. Shick, Bela, "Common Forms of Childhood Tuberculosis," *"Med. Clinics of N. A.*, May 1939, 23, 660.
4. Myers, J. Arthur, "The Detection of Tuberculous Infection, *Jour. A.M.A.*, May 13, 1939, 112, 1907.
5. Amberson, J. Burns, Jr., "The Lasting Cure of Early Tuberculosis, *"Jour. A.M.A.*, Dec. 11, 1937, 109, 1951.

Progress in the Diagnosis and Treatment of Pneumonia*

ELLIS B. FREILICH, M. D.**
Chicago, Illinois

The greatest progress in the present-day knowledge of pneumonia is the better understanding of its bacteriology. Although a number of different bacteria, such as the streptococcus, Friedlander bacillus, influenza bacillus, etc., may be causative agencies, the most important organisms in pneumonia are the several types of pneumococci, which together are responsible for about 95 per cent of all cases.

The extraordinary work of Cooper and her co-workers, in identifying 32 different types of pneumococci and thus eliminating the older concept of only four groups of these organisms, has had a revolutionizing effect on both diagnosis and treatment of pneumonia, for by this work the avenue to the study of specific serum therapy was opened.

It is no longer adequate for the physician to diagnose the presence of pneumonia clinically or to determine the extent of involvement. The bacteriologic type must be determined, whenever this is possible. Diagnosis, therefore, should be made on a bacteriologic rather than an anatomic basis, for successful serum treatment is dependent upon early and accurate bacteriologic type diagnosis.

The importance of such a bacteriologic diagnosis is so generally recognized today that "typing" centers have been established in various private and public laboratories and hospitals in many of the large cities. Such typing services, utilizing the rapid Neufeld technic, are available to physicians without charge, if necessary.

The etiologic bacteriologic type, and the presence or absence of bacteremia, have an important bearing on prognosis, on the expected occurrence of certain complications, and on the therapeutic management of the particular case. While typing and blood-culture data are essential for proper clinical management, the furtherance of epidemiologic studies and, through this, the study of effective preventative measures, would also be greatly hampered, if not made impossible, by abandonment of type diagnosis.

Serum Treatment

Specific serum therapy has made marked advances in the past year, and practically all the horse serum used in this country is refined and concentrated. However, because some of the protein is inseparable from the antibodies, allergic reactions may still occur, either immediately or after several days.

To avoid these reactions, *rabbit serum* was introduced. The rabbit pneumococcus antibody molecule is one-fourth the size of the horse-serum antibody molecule, affording thereby greater effective penetration into tissues and through membranes. By concentration and refinement, a serum of very high potency (often as much as 10,000 or more units per cubic centimeter) is made available, so that the therapeutic dose can be administered in very small amounts, rendering the technic of administration much easier. Thermal and allergic reactions occur less frequently than with the best horse-serum.

When adequate amounts of serum are promptly administered, the mortality from pneumococcic pneumonia is markedly reduced, with prompt and definite improvement in the clinical state of the patient. What constitutes adequate doses varies with many factors and with individual patients: The duration of the pneumonia before serum therapy is begun; the extent of involvement; the presence or absence of complications; the age of the patient; etc. Enough serum must be given to inactivate completely the circulating carbohydrate and sensitize all the organisms (antibodies sensitize the pneumococci so that they are either lysed or phagocyted and destroyed).

It is wasteful to give insufficient serum. Approximately 100,000 units are needed, in an adult, to effect a cure, in most cases of early and not-too-severe involvement. Some

* Reprinted from Clinical Medicine and Surgery, Vol. 47, No. 1, January, 1940.
** Associate Professor of medicine, College of Medicine, University of Illinois.

patients will require more, especially those with bacteremia; those whose infections are due to pneumococci of Types II, III, or VII; or those who have extensive involvement and are seen late in the disease. Other patients may require less. Because the maximum concentration of antibody is required immediately, the serum should be given *intravenously*, in the shortest possible time consistent with the avoidance of chills and other reactions.

It is a safe and wise procedure to precede the administration of serum by testing for possible serum sensitivity, regardless of whether horse or rabbit serum is used, by utilizing intracutaneous or ophthalmic reactions. If no sensitivity is evident, the entire calculated dose may be given, in association with dextrose-saline venoclysis or in divided doses every one to two hours, until improvement results.

At present, serums are available for most of the 32 pneumococci types. The excellent clinical results and lowering of mortality attending the use of specific serum have been adequately demonstrated by numerous workers in all sections of the country. Although best results are attained by the early use of serum, the reduction in the frequency of significant complications following its late administration, warrants its use, regardless of the duration of the pneumonia before treatment is instituted.

Specific serotherapy has its disadvantages. It has not proved effective against Type III pneumococcus pneumonias. It must be specific for the type or it will be ineffective; and, although unfavorable reactions frequently may be forestalled, the possibility of thermal reaction, anaphylactic shock, and serum sickness cannot be eliminated entirely. Finally, the expense may occasionally be prohibitive. Because of this latter objection, in some cities the Board of Health makes available, free of charge, serums for the more common types. Unfortunately, however, only a few cities are thus enlightened.

Sulfapyridine Treatment

Through sulfapyridine, introduced in England in 1938, chemotherapy threatens to displace the position held by serum therapy. It is less expensive, easy to administer, and dramatic in its effects. An initial dose of 2 grams is given, followed by one-gram doses, at four-hour intervals, for 48 hours after the temperature falls to normal; then continued for several days with one gram at six-hour intervals.

Results have been uniformly excellent. Of 60 patients (14 Type I; 16 Type II; 5 Type III; 10 Type VII; 3 each of Types VIII and XII; 2 of Type V; and 1 each of Types IV, IX, XVI, XVIII, XIX, XXIII and XXIV, reported by Volini, Levitt, and Campione[1], only 2 died, giving a mortality of 3.3 per cent, with none of the 5 Type III patients dying. Among 15 patients with bacteremia, there were no deaths.

The nature of sulfapyridine's effectiveness is, as yet, undetermined, but it seems to inhibit the growth of susceptible organisms. It does not function as does specific antiserum in the neutralization of free carbohydrate substance ultimate success of this drug is probably dependent upon the patient's ability to produce an adequate antibody response to the infection.

The use of sulfapyridine is not without danger and patients must be watched carefully. Nausea and vomiting are common occurrences and, if severe, so distress the patient that the drug must be stopped. The newer soluble, injectable sodium salt may obviate this trouble, provided the cause of the vomiting is not central in origin.

Interference with kidney function, hematuria, azotemia, and renal calculi formation have been observed. Other complications are similar to those observed with sulfanilamide therapy, but cyanosis is less common with sulfapyridine than with sulfanilamide therapy. Acute hemolytic anemia may arise within the first three days of treatment and warrants immediate discontinuance of the drug. Leukopenias have been observed and, if the white cell count is low before beginning treatment, it may be a serious complication. Agranulocytosis, however, does not occur until treatment has been maintained for from 10 to 14 days or longer. Drug fever sometimes occurs but is difficult to evaluate, and rashes, particularly of the morbilliform type, occur with the same frequency and under the same conditions as with sulfanilamide.

Despite these reactions, which may occur and should be watched for, sulfapyridine gives

great promise of further reducing the mortality from pneumococcic pneumonia.

More recent experimental and clinical data suggest that sulfapyridine and specific serum exert a synergistic action, and the combined use of the two affords advantages not possessed by either one alone. This is particularly true with Type III pneumococci infections. It is, therefore, suggested that the combined therapy be used in adult Type III infections, as well as in all cases when treatment is begun after the third day, when two or more lobes are involved; when the patient is over 40; and in the presence of bacteremia or other complications, such as pregnancy. Serum therapy alone is to be preferred in patients who have had anemia, granulopenia, fever, or drug rashes from previous sulfanilamide or sulfapyridine therapy.

In the final analysis, the physician must remember that he is treating a *patient with pneumonia*, and not pneumonia alone. Therefore, good nursing and dietary care, adequate fluid intake, oxygen therapy when indicated, prolonged rest, and sedation are as important today as they were in years past, despite our newer approach to the problem with sero- and chemotherapy.

55 E. Washington St.

1. Volini, Italo F.; Levitt, Robert O.; and Campione, N. Louis: *Ill. M. J., 76: 420-424*, November, 1939.

Modern Treatment of Pneumonia*

With Discussion of Atypical Types Nonpneumococcus Infections

O. P. J. FALK, M. D.**
St. Louis, Missouri

Among the latest compounds of sulfanilamide which have achieved therapeutic significance in the treatment of respiratory infections during the last year are neoprontosil and sulfapyridine. Current observation would seem to indicate that neoprontosil is as active in equal dosage as sulfanilamide and less toxic, grain for grain. Rosenthal[1] showed that the therapeutic effect of neoprontosil when given orally is probably greater than when given parenterally because of its slower renal elimination with the oral method. I have used oral neoprontosil rountinely in pneumonitis and broncho-pneumonia during the last winter when sputum examination revealed the streptococcus to be the predominant organism. In order to exclude the possibility of an early atypical pneumococcus pneumonia being obscured in its early stages, the physical, sputum and sometimes roentgen ray findings were checked daily. If a patient happens to harbor a higher type of pneumococcus, a nonpneumococcus influenzal pneunitis or bronchial pneumonia may be mistaken for and treated as a higher type of pneumococcus pneumonia unless carefully differentiated by the mode of onset, the clinical course, the nature of the physical findings and the blood picture. This problem has presented itself not infrequently in my consultant practice.

Neoprontosil also has been used routinely in streptococcus throat infections coming on my hospital service. It seemed apparent that there were fewer toxic reactions than one had been accustomed to encounter with sulfanilamide. I have seen no instance of hemolytic anemia or agranulocytosis following the use of neoprontosil in the pulmonary and throat infections described, although they have been reported and must be carefully watched for. Because of its generally less toxic manifestations, neoprontosil is usually fairly well tolerated and may be tried in cases which have proved intolerant to sulfanilamide. I have encountered a few mild toxic effects somewhat similar to sulfanilamide reactions such as headache, dizziness,

* Reprinted from the Journal of the Missouri Medical Ass'n., Vol. 37, No. 1, January, 1940.
** From the Department of Internal Medicine, St. Louis University School of Medicine.

lassitude, nausea and vomiting and an accasional minor degree of cyanosis. The latter complication is controlled usually by giving a 2 grain capsule of methylene blue three times daily. Mild fever and acidosis occasionally may follow the use of the drug. Neoprontosil imparts a reddish tint to the urine and even to the skin, especially in blond types, more particularly when it is given parenterally. The oral dose of the drug ranges from 0.6 to 1 gram (10 to 15 grains) every four to six hours or a total of from 4 to 6 grams a day depending upon the severity of the infection, the age and weight of the patient and the tolerance to the drug. Where neoprontosil is not tolerated by mouth, I have used it per rectum by dissolving 3 grams (nine 5 grain tablets) in 100 cc. of saline solution and giving the solution two or three times daily. The binding substance in the tablets is insoluble and falls to the bottom of the solution, and is decanted off.

Pneumococcus Pneumonia

Recent developments in pneumococcus pneumonia therapy have been dramatically significant. Present day therapy has at its disposal specific type serum therapy and sulfapyrodine. Other therapeutic advances in the treatment of pneumonia include the early use of oxygen in toxic cases, either by nasal catheter or tent depending upon the degree of oxygen needed; the use of intravenous sucrose for pulmonary edema; provision for supplementing salt and vitamin C intake, and the proper interpretation and treatment of circulatory failure when it occurs, as an expression of peripheral vasomotor collapse rather than myocardial failure in most instances. Actual heart failure as a terminal factor in pneumonia fatalities is rarely seen unless there has been a history of antecedent cardiac disability, or when some objective evidence of cardiac damage is present, such as significant valvular lesions, auricular fibrillation, gallop rhythm or electrocardiographic evidence of significant myrocardial damage or acute coronary pathology.

Serum Therapy

The use of specific type sera which are now available for all of the thirty types of pneumococcic pneumonia which has proven so successful in lowering the death rate needs little amplification except to emphasize the importance of prompt sputum typing and routine blood culture, the proper investigation of serum sensitiveness and adequate dosage (80,000 to 200,000 units) depending upon the day in the course of the disease, the presence of bacteremia, the response and age of the patient and the number of lobes involved. The initial test dose of 20,000 units is usually given intravenously although the intramuscular route is preferable for the first dose in the extremely sick, toxic patient. The balance is given intravenously two hours later or 20,000 units every two hours until the full complement has been given. Details of the indications for the serum with sulfapyridine are discussed later.

Sulfapyridine Therapy

Current reports upon the remarkable effectiveness of sulfapyridine in lowering the mortality rate of pneumococcus pneumonia give ample justification to the mounting enthusiasm this type of chemotherapy has evoked. Furthermore, the relative simplicity of its application, providing it is administered correctly and properly controlled, with all its potential toxic effects, complications and indications for abrupt cessation constantly kept in mind, as compared with the relatively greater technical difficulties associated with serum therapy with its greater expense, frequent inavailability and the many types that must be accurately determined and specifically applied, renders this new specific drug one of the outstanding therapeutic achievements of all time. The special report of the Council on Pharmacy and Chemistry of the American Medical Association[2] published May 6, 1939, states that "while there is much to be learned about the exact place of sulfapyridine in the treatment of pneumonia, it appears to be a useful measure in many cases when properly applied." The Council accepted the drug for inclusion in the New and Non-Official Remedies, advocating caution in its use and emphasizing the continued indication for typing of pneumonia cases not only for statistical purposes but for the immediately practical reason that the drug may prove ineffective or have to be discontinued and be replaced by serum therapy. Perhaps the cir-

cumstances attendant to the case may make combination drug and serum therapy advisable. As to sulfapyridine interfering with the capsule of the pneumococcus and consequently with typing, Plummer and Ensworth[3] report that they have not been able to confirm this warning. In a series of seventy-five retyped cases capsular swelling occurred whenever pneumococci were present even after as much as 40 grams of the drug had been given. Nevertheless, it is not only important to type the sputum as soon as obtainable in every case but also to repeat the typing in the event that proper response to therapy is not obtained or when there is evidence of re-infection, as the bacterial flora in the sputum sometimes changes during the course of pneumonia whether specific treatment is given or not.

The chemotherapeutic action of the drug seems to be a bacteriostatic effect upon the pneumococcus, that is, sulfapyridine injures the pneumococcus or perhaps acts as a barrier between the pneumococcus and the tissues, whereas, serum fortifies the pneumonia patient by enhancing his immunity and giving him a specific substance to neutralize the toxins of the pneumococcus.

I have adopted the following rules of procedure which seem justified by the present state of our knowledge concerning sulfapyridine therapy:

1. Sulfapyridine therapy should be started promptly as soon as the clinical picture of pneumonia is presented, even if atypical, or preclinically in its earliest expression. It is probably better to err on the side of over zealousness in anticipating pneumonia than to lose a few hours or perhaps a day or two waiting for the complete and unmistakable expression of the disease. Not only must the clinical history of onset be taken into consideration but full appreciation of its very earliest physical signs and the supportive corroboration offered by the leukocyte picture, both quantitative and qualitative, and roentgen ray examination when considered necessary and available. Immediately upon the completion of such initial positive and differential diagnostic investigation, including examination and typing of sputum when obtainable and blood culture, 2 grams of sulfapyridine should be given. It has been my custom[4] to follow this with an additional 2 grams at the end of four hours and thereafter 1 gram every four hours, to be continued day and night until two days after the temperature drops. After that, 3 grams a day are given for another three days. When there is no striking clinical improvement or drop in temperature after from thirty-six to forty-eight hours of treatment, in spite of a sulfapyridine blood concentration of from 4 to 5 mg. per cent, the drug should be stopped as the patient's immunity mechanism is probably impaired or impotent and specific serum should be given in full dosage without delay, following determination of serum sensitiveness by the conjunctival test. Complete bacteriologic control includes routine blood culture in most instances, justifies the use of combination chemotherapy and specific serum treatment. Combination therapy is also indicated in type III cases or when treatment is begun after the third day of the disease, or in an extremely sick patient past middle life or where pregnancy or significant constitutional disease is present as a complication.

2. Daily leukocyte and Schilling counts, hemoglobin and urine examination during the time of active sulfapyridine therapy and determination of blood sulfapyridine level the second day of treatment represent ideal control, where practically possible. Blood sulfapyridine levels vary considerably with individual absorption rates, but the blood concentration does seem to rise steadily for the first twelve to twenty-four hours and then to assume a moderately constant level. There seems to be no definite correlation between the blood level and the clinical response.

When adequate laboratory control is impossible because of remoteness from hospital facilities it is my conviction that the probability of benefit from sulfapyridine therapy far outweighs the chance of potential danger, and I doubt whether any conscientious physician would deny a pneumonia victim the chance of halving the mortality of his disease simply because adequate control was impossible. Under such circumstances I advise such simple precautions as daily urine measurement and examination, daily bedside Talquist hemoglobin estimation and daily simple blood smear, the slides of which can be mailed to the nearest laboratory for a qualitative esti-

mation of the leukocyte picture. Should evidence of leukopenia or agranulocytosis develop the information can be wired or phoned to the physician and prompt cessation of the drug advised.

3. Accessory therapeutic measures indicated in the comprehensive management of any pneumonia patient should be employed carefully such as attention to mental and physical rest, the promotion of general bodily comfort and the provision for oxygen therapy when indicated.

Indications for Stopping Sulfapyridine

1. In order to minimize the frequent nausea and vomiting which accompany the use of this drug, I have been having the tablets enterically coated with salol and now am using an enteric sealed tablet supplied us for investigative use.* In the event the drug is still not tolerated (nausea and vomiting per se do not contraindicate the continued use of the drug) the sodium salt of sulfapyridine can be given by rectum in a 5 per cent solution with normal saline, or intravenously in 5 per cent solution in a daily total amount of 1 grain (0.06 gm.) per kilo of body weight, divided into two or three doses. Sodium sulfapyridine is supplied in England and France in a 33.3 per cent solution for intramuscular injections. Reports so far have not indicated whether pain or local damage may follow such use but the intramuscular method has been advocated by only one investigator in this country. The hesitancy in using this substance intramuscularly comes from its etxremely alkaline nature, it having a pH of 10 to 11, which should render it relatively unsuitable for intramuscular injections.

2. Indications for complete cessation of the drug in any form are leukopenia, evidence of hemolytic anemia and anuria. Hematuria alone does not necessarily indicate stopping the drug in a critical situation where continuation of effective chemotherapy may mean the difference between life and death. It has been determined that hematuria is probably produced from the mechanical irritation of the sharp crystals of acetyl sulfapyridine formed in the tubules, pelves and ureters. I have noted moderate elevation in the blood nonprotein nitrogen along with oliguria in the course of sulfapyridine therapy which subsided promptly upon cessation of the drug and augmented fluid intake with the intravenous injection of glucose and sodium locate (Hartman's solution).

Cyanosis, other than that produced by the anoxemia of the disease (usually controlled by oxygen therapy, the nasal oxygen method being often sufficient) is combatted effectively in most cases by the use of small doses of methylene blue, 2 grain capsules three times a day. This does not constitute a contraindiction for continuation of the drug. Should a serious protracted anuria occur during or following a course of sulfapyridine therapy, it is probable that ureteral catheterization with continued drainage would be indicated by the nature of the pathologic condition associated with hematuria in that it is quite possible that local edema caused by mechanical injury from acetyl sulfapyridine crystals might produce ureteral obstruction at the pelvic orifice.

Other toxic manifestations of sulfapyridine include such phenomena as rash, fever, lassitude, headache and dizziness, none of which constitute a contraindication of the full expression of the drug.

The febrile reactions to sulfapridine are sometimes considerably delayed and often are difficult of interpretation as Seibert[5] observed five cases showing leukocytosis and a shift to the left from the sulfapyridine effect alone, any evidence of infection having been ruled out. The differential blood picture was characterized by an increase in the immature forms and a decrease of lymphocytes and monocytes, thus presenting an infectious blood picture.

In concluding, I feel that meticulous care and continued careful observation are imperative in order that well ordered progress may continue to mark the advance of chemotherapy in the control of pneumonia.

301 Humboldt Building.

BIBLIOGRAPHY

1. Rosenthal, Bauer and Braham: Studies in Chemotherapy, Public Health Report 52:662-671 (May) 1937.
2. Special Report of the Council on Pharmacy and Chemistry, Sulfapyridine, J. A. M. A. 112:1830 (May 6) 1939.
3. Plummer, N., and Ensworth, H. K.: Sulfapyridine in the Treatment of Pneumonia, J. A. M. A. 113 (Nov. 8) 1939.
4. Falk, O. P. J.: Current Trends in the Treatment of the Acute Respiratory Infections, Bull. St. Louis Med. Soc. 33:426 (April 21) 1939.
5. Seibert, Walter: Pathologist to DePaul Hospital, St. Louis. Personal communication.

Organization News

NEW GOVERNORS OF THE COLLEGE

Dr. Ralph C. Matson, president of the College announces the appointment of the following Governors to fill unexpired terms of office in the following states:

Connecticut: Dr. James J. Hennessy, Hartford, to succeed Dr. William M. Stockwell, Hartford. Term expires 1942.

Kentucky: Dr. Paul A. Turner, Louisville, to succeed Dr. Edward J. Murray, Lexington. Term expires 1940.

Michigan: Dr. George McLoid Waldie, Ishpeming to succeed Dr. John Alexander, Ann Arbor. Term expires 1941.

NEW MEDICAL JOURNAL PUBLISHED IN MEXICO

Dr. Donato G. Alarcon, Mexico City, D.F., Governor of the American College of Chest Physicians for Mexico is the editor of a new Journal on Tuberculosis published at Mexico City, entitled, "Revista Mexicana de Tuberculosis". It is the official organ of the Mexican Society for the Control of Tuberculosis. Other Fellows of the College in Mexico who are on the staff of the Journal are: Drs. Octavio Bandala and Ismael Cosio Villegas.

APPOINTED CHAIRMAN OF TUBERCULOSIS COMMITTEE

Dr. Champ H. Holmes, Atlanta, Georgia, past president of the American College of Chest Physicians, and chairman of the Committee for the Advancement of Scientific Programs in Organized Medicine of the College, was appointed chairman of the Tuberculosis Committee of the Fulton County Medical Society. The other members of the committee are: Drs. C. C. Aven, A. Worth Hobby, J. C. Burch, and T. I. Willingham, all of Atlanta. All of the members of the committee with the exception of Dr. Willingham are Fellows of the American College of Chest Physicians. Dr. Champ Holmes is also chairman of the Tuberculosis Committee of the Georgia State Medical Society.

RECEIVES REWARD

Dr. Jay Arthur Myers, Minneapolis, Minnesota, a Regent of the American College of Chest Physicians, was honored by the Society of Puerto Rican Tuberculosis Physicians by the award of the 1939 Gold Medal for outstanding work in the field of tuberculosis. Dr. Myers was a guest speaker before the annual meeting of the Puerto Rico Medical Association and while in Puerto Rico, he gave a series of lectures under the auspices of the society.

GIVEN A FELLOWSHIP

Dr. Robert Charr, Philadelphia, Pennsylvania, a Fellow of the American College of Chest Physicians, was given a Joseph V. Horn Fellowship for the Study of Pulmonary Tuberculosis at the Department of Diseases of the Chest of the Jefferson Hospital, Philadelphia.

DR. LOUIS MARK VISITS EL PASO

Dr. Louis Mark, Columbus, Ohio, a Fellow of the American College of Chest Physicians and an Associate Editor of 'Diseases of the Chest" was given a luncheon by the Fellows of the College at El Paso on December 29th at the Hilton Hotel, El Paso, Texas.

Those who attended the luncheon were: Drs. O. E. Egbert, Governor of the College for the State of Texas; C. M. Hendricks, member of the Editorial Board of "Diseases of the Chest"; R. B. Homan, Jr., Secretary-Treasurer of the College; R. B. Homan, Sr., Ralph H. Homan, Felix R. Miller, James W. Laws, Arthur D. Long, all Fellows of the College; and the folowing officers of the El Paso County Medical Society: Dr. Leslie M. Smith, President of the El Paso County Medical Society; Dr. J. L. Stowe, Secretary-Treasurer of the El Paso County Medical Society; Dr. M. P. Spearman, Editor of *Southwestern Medicine*, the official publication of the Southwestern Medical Association, and Murray Kornfeld, Executive Secretary of the College. Dr. Egbert presided at the luncheon meeting.

ATTEND EXECUTIVE COMMITTEE MEETING OF N. T. A.

The following officers of the American College of Chest Physicians, who are members of the Executive Committee of the National Tuberculosis Association attended the meeting of the Executive Committee of the N. T. A., held at New York City on December 9th:

Dr. Lewis J. Moorman, Oklahoma City, Oklahoma; Dr. Paul H. Ringer, Asheville, North Carolina; Dr. H. Frank Carman, Dallas, Texas; and Dr. Sydney A. Slater, Worthington, Minnesota. Drs. Moorman, Ringer, and Carman are Regents of the College and Dr. Slater is the Governor of the College for the State of Minnesota.

GOVERNOR OF COLLEGE SPEAKER IN LOUISIANA

Dr. Paul A. Turner, Louisville, Kentucky, Governor of the American College of Chest Physicians for the State of Kentucky, was the principal speaker at the annual meeting of the Louisiana State Tuberculosis Society.

OBITUARY

Ray S. Norris

1900-1939

Dr. Ray S. Norris, Sanatorium, Texas, a Fellow of the American College of Chest Physicians died at the State Tuberculosis Sanatorium, Sanatorium, Texas, on December 9th, 1939. Dr. Norris was a native of the State of Texas and he received all of his education in the state. He received his A. B. degree in 1920 from the University of Texas and his M. D. degree from the University of Texas School of Medicine in 1922. He interned at the Robt. B. Green Hospital at San Antonio, Texas for fifteen months, practiced medicine at Tampico, Mexico; and at Harlington and Houston, Texas; and was a resident physician at the Texas State Tuberculosis Sanatorium for eight years, with the exception of two years spent in the private practice of medicine at Houston for two years.

Dr. Norris devoted a large part of his time at the State Tuberculosis Sanatorium to the study of Tuberculosis in children and he contributed a number of scientific papers on this subject.

He is survived by his widow and a son, Peter McKnight Norris, age two; his mother, Mrs. G. B. Norris, and two sisters.

A modern and thoroughly-equipped institution for the treatment of all forms of tuberculosis. Beautiful accommodations for patients, including private suites with glass-enclosed sun parlors.

Medical equipment is complete, with everything used in the present day methods of diagnosis and treatment.

A home-like atmosphere is obtained at all times.

Chest Clinic and Out-Patient Department, 1018 Mills Building.

HENDRICKS-LAWS SANATORIUM

EL PASO, TEXAS

CHAS. M. HENDRICKS & JAS. W. LAWS, Medical Directors

Laurel Beach Sanatorium

SEATTLE **(On the Salt Water Beach)** **WASHINGTON**

A private sanatorium fully equipped for the modern treatment of Chest Diseases.....X-Ray, Fluoroscope, Pneumothorax, Phrenectomy and Thoracoplasty....Special diets when required; private and semi-private rooms. Rates: From $25.00 per week up, including medical care.

FREDERICK SLYFIELD, M.D. **JOHN E. NELSON, M.D.** **RAYMOND E. TENNANT, M.D.**

DELIVERS PAPER AT SOUTH CAROLINA

Dr. B. L. Chipley, Paterson, New Jersey, a Fellow of the American College of Chest Physicians, delivered a paper before the Greenwood County Medical Society, South Carolina, on December 19th. Dr. Chipley spoke on "Modern Chest Surgery and Anesthesia".

MAKE YOUR RESERVATIONS EARLY

If you plan on attending the Sixth Annual Meeting of the American College of Chest Physicians to be held at the Biltmore Hotel, New York City, June 8-10, 1940, it is advisable that you make your reservations for rooms early. The meeting of the American Medical Association starts on *June 10th* and desirable rooms are difficult to obtain unless you have made reservation for same. If you will notify the Executive Secretary of the College as to your requirements, arrangements will be made with the management of the Biltmore Hotel to take care of same. *Do this now.*

DR. STOCKWELL RESIGNS POSITION

Dr. William M. Stockwell, for twenty-three years superintendent and medical director of the Cedarcrest Sanatorium, Hartford, Connecticut, has resigned his position and he now resides at Dunedin, Florida. Dr. Stockwell was the Governor of the College for the State of Connecticut at the time of his retirement.

HOST TO MEDICAL SOCIETY

The officials at the Forest Lawn Sanatorium, Jefferson, Wisconsin, were hosts to the members of the Jefferson County Medical Society for their Fall Meeting held at the sanatorium on November 16th. Dr. Alfred A. Busse, a Fellow of the College is the Medical Director of the Jefferson County Sanatorium, and a program dealing with tuberculosis was presented.

CHANGE OF ADDRESS

Dr. Ralph M. Alley, formerly of Fort Lapwai Sanatorium, Lapwai, Idaho, has been appointed medical director of the Shanee Indian Sanatorium, Shawnee, Oklahoma. Dr. Alley is a Fellow of the American College of Chest Physicians.

ELECTED VICE-PRESIDENT

Dr. W. G. Paradis, Crookston, Minnesota, a Fellow of the American College of Chest Physicians, was elected as Vice-President of the Red River Valley Medical Society for the year of 1940.

ADDRESSES SARANAC LAKE MEDICAL SOCIETY

Dr. Wayne Henning, Lake Kushaqua, New York, a Fellow of the American College of Chest Physicians, was the principal speaker before the regular meeting of the Saranac Lake Medical Society held at the Black Memorial Library, Saranac Lake, New York, on November 15th. Several members of the staff at the Stony Wold Sanatorium at Lake Kushaqua also spoke at the meeting.

RECEIVES APPOINTMENT

Dr. John H. Skavlem, Cincinnati, Ohio, a Fellow of the American College of Chest Physicians, was named acting director of the medical service for 1940 of the Hamilton County Tuberculosis Sanatorium, Cincinnati, Ohio. He succeeds Dr. H. Kennon Dunham with whom he has been associated at the sanatorium since 1921.

RESIGNS POSITION

Dr. E. E. Clovis, Wheeling, West Virginia, a Fellow of the American College of Chest Physicians has resigned his position as medical director of the Ohio County Tuberculosis Sanatorium, Wheeling, West Virginia. He has been succeeded by Dr. Charles G. Morgan.

NOTICE

IF YOU HAVE NOT AS YET PAID YOUR DUES FOR 1940; IT IS REQUESTED THAT YOU DO SO AT ONCE. PROMPT PAYMENT OF DUES KEEPS DOWN THE OVERHEAD OF YOUR ORGANIZATION AND ASSURES YOUR GOOD STANDING IN THE SOCIETY. ALL OF YOUR OFFICERS AND YOUR EXECUTIVE SECRETARY SERVE THE COLLEGE WITHOUT COMPENSATION FOR THEIR SERVICES. YOU CAN SIMPLIFY THEIR TASKS BY PAYING YOUR DUES PROMPTLY.

R. B. HOMAN, Jr., *Secretary-Treasurer*
American College of Chest Physicians

Your Standard of Value — Aloe Equipment

The medical profession has benefited through many years from the Aloe nation-wide price policy. Aloe catalogs set the standard of values in medical-surgical supplies the country over. Use Aloe mail order service—patronize your Aloe representative—for your greatest values!

A. S.
ALOE CO.
ST. LOUIS — LOS ANGELES